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How low-cost air pollution sensors could make homes smarter?

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The majority of people spend most of their time indoors, where they are exposed to indoor air pollutants. Indoor air pollution is ranked among the top ten largest global burden of a disease risk factor as well as the top five environmental public health risks, which could result in mortality and morbidity worldwide. The spent time in indoor environments has been recently elevated due to coronavirus disease 2019 (COVID-19) outbreak when the public are advised to stay in their place for longer hours per day to protect lives. This opens an opportunity to low-cost air pollution sensors in the real-time Spatio-temporal mapping of IAQ and monitors their concentration/exposure levels indoors. However, the optimum selection of low-cost sensors (LCSs) for certain indoor application is challenging due to diversity in the air pollution sensing device technologies. Making affordable sensing units composed of individual sensors capable of measuring indoor environmental parameters and pollutant concentration for indoor applications requires a diverse scientific and engineering knowledge, which is not yet established. The study aims to gather all these methodologies and technologies in one place, where it allows transforming typical homes into smart homes by specifically focusing on IAQ. This approach addresses the following questions: 1) which and what sensors are suitable for indoor networked application by considering their specifications and limitation, 2) where to deploy sensors to better capture Spatio-temporal mapping of indoor air pollutants, while the operation is optimum, 3) how to treat the collected data from the sensor network and make them ready for the subsequent analysis and 4) how to feed data to prediction models, and which models are best suited for indoors.